

ON A SPECIAL ACARID CHAMBER FORMED WITHIN THE BASAL
 ABDOMINAL SEGMENT OF BEES
 OF THE GENUS *KOPTORTHOSOMA* (*XYLOCOPIINÆ*).

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The genus *Koptorthosoma* was formed by Gribodo for the reception of certain species previously placed in *Xylocopa*. They differ greatly from the bees of that genus in the structure of the posterior part of the thorax, and the base of the abdomen. The scutellum is abruptly deflexed posteriorly, so that a sharp edge is formed which slightly projects over the post-scutellum. The basal segment of the abdomen is sharply truncate in front, the basal portion being strongly concave, and is very closely applied to the thorax, the edge dividing its dorsal and anterior surfaces, fitting beneath the sharp edge of the scutellum. Owing to the concavity of the parts, a closed cavity is thus formed between the hind part of the thorax and the base of the abdomen. If the basal concavity of the first abdominal segment be examined in the female bee, a distinct orifice will be found in the middle, generally small and overhung with hairs, but in some species large and quite exposed. An examination of the interior of this segment will reveal a large chitinous chamber, transverse, and filling a large part of the interior of the segment in most species, but in some smaller and rounded in form. The form of the chamber would appear to be constant for a particular species of bee.

The orifice above mentioned is the external opening of this chamber. Examples of a species of *Acarus* of unusually large size appear to be always found within the chamber; sometimes they entirely fill up the cavity. In dead examples of the bees an *Acarus* will often be seen with its front parts projecting through the orifice, and its existence was first made known to me in this manner. I have examined the female of seven species of *Koptorthosoma*, viz., *K. latipes*, *K. tenuiscopa*, *K. æstuans*, *K. verticalis*, *K. cærulea*, *K. caffra*, and *K. trepida*.

In the females of all these species the chamber was found, and *Acaris* within in. It is noteworthy that the latter two species are from South Africa, the others from India or the Indo-Malay region. The males of the two first-named species have also been examined, as well as a number of undetermined species, but they have no chamber for *Acaris*, although the external structure of thorax and abdomen is similar to that of the female. The spot where the orifice of the chamber is situated in the ♀ is in the other sex occupied by a more or

less deep depression, showing on the inside of the segment as a small tubercle, and this may obviously be regarded as an excessively rudimentary condition of the structure found in the female.

Not every species of *Koptorthosoma*, however, possesses the chamber, for Dr. Willey has brought home from New Britain females of a species, very closely allied to *K. æstuans*, which show no more trace of it than do the males of those species above mentioned. In no true *Xylocopa* (either ♂ or ♀), of which many species have been examined, is there any chamber or orifice. The large *Acarid* I have not yet found entirely outside the chamber. Minute examples often abound on the thorax posteriorly, and sometimes may be seen arranged in a regular transverse row at the base of the hairs. These may either be the young of the large individuals, or belong to some other species.

The fact that the chamber is found only in the female bees is of interest and importance, for, as every Hymenopterist is aware, the male bees are short-lived and vagrant, rarely returning to the nest for more than a few days, so that parasites attached to this sex would be placed under very disadvantageous circumstances.

The hind portion of the thorax of Aculeate *Hymenoptera* is always a favourite resting place for parasites, and it is probable that they attack the soft membranes which connect the abdomen and thorax—the only spot apparently that is open to attack. One may sometimes pick up large *Bombi* so weakened by these *Acarid* parasites as to be quite unable to fly. Sharp has suggested [*Ent. Mo. Mag.*, xv (1878), p. 154] that the accurate co-adaptation of external parts of certain beetles (*Heliocopris*) is for the purpose of excluding parasites from parts liable to be attacked. We have seen a Staphylinid struggle furiously to rid itself of a single minute *Acarus*.

The protection afforded to the parasites by living enclosed is obvious enough, and it would probably be an advantage to the bees to have these large *Acarid* confined in a special chamber. There is, however, no positive evidence that they do keep within it, and from the fact that in dried specimens they are so often found partly emerging from the orifice, the contrary would appear to be the case.

Moreover, it may be observed in some species of the bees that a row of stiff hairs is directed obliquely over the orifice from above, as if to bar the way upwards, while on the lower side it is nearly or altogether unprotected, and a deep groove extends directly from it to the membranes of the abdominal articulation, as if to actually guide the parasites to the weak parts. Around the point of articulation

there may often be seen a dense mass of very minute parasites. So far as one can judge from the examination of the structures it would appear that these are produced entirely to the disadvantage of the bee, seeing that they afford a secure retreat to the parasites, and place them in a most convenient position for attacking what is perhaps the most vulnerable part to be found on the creature they infest. However, as the existence of the chamber and the parasites is well known to Mr. E. E. Green, of Ceylon, and other entomologists, who are in a position to make direct observations on the living insects, it is to be hoped that such observations will shortly be made. I am very much indebted to Dr. Sharp for furnishing me with the species of *Koptorthosoma* enumerated above for examination, and to Dr. Willey for his most interesting specimens from New Britain.

A somewhat similar case known to me is that of a wasp of the genus *Odynerus*, found in Arizona and Mexico. If, in a female example of this wasp, the second segment of the abdomen be pressed downwards so as to expose the basal portion, which, in a natural position, lies beneath the first, it will be seen that this portion is very deeply constricted, and extremely long, projecting far beneath the basal segment. Naturally, the apical margin of the basal segment rests on the front of the non-constricted part of the second, so that an extensive closed cavity is formed, limited in front by the intersegmental membrane of the two segments. This cavity is filled with minute *Acari*, which dispose themselves in the most regular order, so as not to interfere with the movements of the segments. As in the case of the parasites of *Koptorthosoma*, these *Acari* are also placed in a position most favourable for protection, and for access to a soft part, viz., the membrane connecting the first two segments. The male of the wasp has only the narrow constriction at the base of the second segment, as is usual in the genus, and *Acari* were altogether absent in all those examined.

Cambridge: December 14th, 1898.

ORTHOPTERA FOUND AROUND JERUSALEM IN 1893 AND 1896.

BY A. H. SWINTON, F.E.S.

FORFICULARIA.

FORFICULA AURICULARIA, L.—Dr. Festa found this insect at Jerusalem on March 17th, 1893 (Boll. dei Mus. di Zool. Torino, December, 1893).

BLATTODEA.

PERIPLANETA ORIENTALIS, L.—Dr. Festa says that this domestic plague is